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Six new *Russula* records from Turkey

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Abstract — During field studies in 2012–13, six *Russula* species from the Samanlı Mountains region were identified as new records for Turkey: *R. clariana*, *R. faginea*, *R. insignis*, *R. odorata*, *R. sericatula*, and *R. velutipes*. Descriptions of the taxa along with their distinct features are given and a key to the species is provided.

Key words — *Basidiomycota*, *Russulaceae*, Turkish mycobiota

Introduction

There have been many studies of the diversity of macrofungi in Turkey. Sesli & Denchev (2008) noted that 2158 macrofungi species were recorded for Turkish mycota. Subsequent studies by Sesli & Kobayashi (2014), Güngör et al. (2014), Solak et. al (2014a,b), Sesli (2014), Uzun et al. (2014), and Akata et al. (2014) have increased that number to 2191. Here we record six additional *Russula* spp. collected in Samanlı Mountains, Turkey

Samanlı Mountains lie southeast of the Marmara Region and stretch between Bozburun at the edge of Armutlu Peninsula in the west and Geyve Strait formed by Sakarya River in the east. A close look on the natural vegetation of the area highlights kermes oak (*Quercus coccifera* L.), holly oak (*Quercus ilex* L.), and bay laurel (*Laurus nobilis* L.) as the main shrubs and ligneous plants in the maquis formation of Samanlı Mountains up to 500–600 m. Hawthorn (*Crataegus oxyacantha* L.) and boxwood (*Buxus sempervirens* L.) are also seen in patches among maquis elements. Main ligneous plants in the forest cover of the area are pedunculate oak (*Quercus robur* L.), oriental beech (*Fagus orientalis* Lipsky), Uludağ fir (*Abies bornmuelleriana* Mattf.), chestnut (*Castanea sativa* Mill.), black pine (*Pinus nigra* subsp. *pallasiana* (Lamb.) Holmboe, stone pine (*Pinus pinea* L.), Turkish pine (*Pinus brutia* Ten.), common hornbeam

(*Carpinus betulus* L.), and Scots pine (*Pinus sylvestris* L.). Also seen in patches are groups of oriental plane (*Platanus orientalis* L.), maple (*Acer platanoides* L.), and white poplar (*Populus alba* L.). The area is located in the Mediterranean climatic zone, and the annual rainfall varies between 400mm and 1200mm in different regions (Akman, 1999).

Materials & methods

The macrofungi were collected in the provinces Bursa, Yalova, Kocaeli during 2012–13. Important macroscopical features and ecological information were noted in the field, and digital images were taken of the specimens in their habitat. Collected specimens dried in dehydrators after each study day; the dried materials were put into plastic bags to bring them to the fungarium in good condition for further analysis.

Micromorphological characters were examined using a Leica DM3000 light microscope and photographed digitally. Specimen tissues were examined in Melzer's reagent, 5% KOH, and SBA (sulfobenzaldehyde), and the pileus context was spot-tested with $FeSO_4$ and phenol. At least 20 spores per specimen were measured. The specimens were identified according to Galli (2003), Sarnari (1998, 2006), and Kränzlin (2005). The specimens are kept in the Fungarium of Selçuk University, Konya, Turkey (SELUK).

Taxonomy

Russula clariana Kuyper & Vuure, Persoonia 12: 452. 1985. Figs 1a, 2a

Pileus 40–70 mm across, hemispherical when young, later plane, violet, purple, usually light olive color in the center, margin short striate. Lamellae white, narrowly attached. Stipe 30–50 × 10–20 mm, cylindrical to slightly clavate, white. Spores 7–8.5 × 6–7.5 µm, subglobose, with solitary warts. Basidia 35–55 × 10–15 µm, clavate, with 4 sterigmata. Cheilocystidia and Pleurocystidia 45–85 × 10–15 µm, fusiform to clavate, with gray-black contents in SBA.

Macrochemicals: $FeSO_4$ negative, phenol light rose.

Specimens examined: **Turkey**, **Bursa**: Mahmudiye, Taşlıtarla, 40°36′09″N 29°46′04″E, 947 m, on soil under *Fagus orientalis*, 4 Jun 2013, leg. H.H. Doğan & Ö. Öztürk, HHD 10308, 10319, 10453 (SELUK).

Russula faginea Romagn., Russules Eur. Afr. Nord: 681. 1967. Figs 1b, 2b,c

Pileus 40–80 mm across, convex to plane, wine-red to pink, usually whitish yellow tones in the center. Lamellae white, narrowly attached. Stipe 30–70 × 10–25 mm, cylindrical, white when young, later yellowing to browning. Spores 7–10 × 6–8.5 µm, subglobose to elliptical, with distant warts. Basidia 45–60 × 10–15 µm, clavate, with 4 sterigmata. Cheilocystidia and Pleurocystidia 45–85 × 11–14 µm, fusiform, obtuse or with a prominent projection, with gray-black contents in SBA.

Figure 1. Basidiocarps: A, *Russula clariana*; B, *R. faginea*; C, *R. insignis*; D, *R. odorata*; E, *R. sericatula*; F, *R. velutipes*.

Macrochemicals: $FeSO_4$ green, phenol reddish brown.

Specimen examined: **TURKEY**, **Yalova**: Çanakpınar, 40°32′40″N 29°11′34″E, 700 m, on soil under *Fagus orientalis*, 7 Jun 2013, leg. H.H. Doğan & Ö. Öztürk HHD10509 (SELUK).

Russula insignis Quél., C.R. Ass. Franç. Av. Sci. 16: 588. 1888. Figs 1C, 3A,B

Pileus 40–60 mm across, plane, funnel-shaped later, dark grey-brown to brown. Lamellae white, turning yellow or brown later, notched. Stipe 30–50 × 10–15 mm, cylindrical, white, turning yellow with age. Spores 6.5–8.5 × 5–6.5 µm, subglobose to elliptical, with elongated warts. Basidia 40–50 × 8–15 µm, clavate, with 4 sterigmata. Cheilocystidia and Pleurocystidia 40–80 × 6–15 µm, clavate to fusiform, with faintly gray- black contents in SBA.

Macrochemicals: $FeSO_4$ pale pink, phenol wine red.

Specimens examined: **TURKEY**, **Bursa**: Gemlik, Haydariye, District No. 250, 40°30′27″N 29°09′44″E, 740 m, on soil under *Quercus coccifera* and *Fagus orientalis*, 3 Jun 2013, leg. H.H. Doğan & Ö. Öztürk HHD10239, 10241 (SELUK).

Russula odorata Romagn., Bull. Soc. Linn. Lyon 19: 76. 1950. Figs 1D, 2D–F

Pileus 30–60 mm across, plane, carmine to light red, entire pileus often strongly fading to white. Lamellae whitish when young after pale yellow, narrowly attached. Stipe 25–50 × 5–10 mm, cylindrical, white and somewhat yellowing from the base upward. Spores 6.5–8.5 × 5.5–7 µm, subglobose to elliptical, with connected warts. Basidia 35–45 × 10–15 µm, clavate. Cheilocystidia and pleurocystidia 45–75 × 10–15 µm, fusiform, apically with a small knob, with gray-black contents in SBA.

Macrochemicals: $FeSO_4$ pink, phenol wine brown.

Specimen examined: **TURKEY**, **Sakarya**: Akyazı, near Keremali Forester Cottage, 40°39′10″N 30°43′38″E, 972 m, on soil under *Fagus orientalis*, 11 Nov 2012, leg. H.H. Doğan & Ö. Öztürk HHD8660 (SELUK).

Russula sericatula Romagn., Bull. Soc. Linn. Lyon 27: 287. 1958. Figs 1E, 3F,G

Pileus 50–80 mm across, plane, later infundibuliform, violet-brown, cinnamon-brown. Lamellae white, narrowly attached. Stipe 50–70 × 10–20 mm, cylindrical, white, turning yellow or brown with age. Spores 7–9.5 × 6–8 µm, subglobose, with elongated warts. Basidia clavate, 40–50 × 10–15 µm, with 4 sterigmata. Cheilocystidia and Pleurocystidia 50–70 × 10–15 µm, fusiform, most with a small apical projection, with gray-black contents in SBA.

Macrochemicals:: $FeSO_4$ light pink, phenol wine brown.

Specimen examined: **TURKEY**, **Kocaeli**: Gölcük, Menekşe Yaylası, District No: 13, 40°35′01″N 29°54′48″E, 890 m, on soil under *Fagus orientalis*, 5 Jun 2013, leg. H.H. Doğan & Ö. Öztürk HHD10398 (SELUK).

Russula velutipes Velen., České Houby 1: 133. 1920. Figs 1F, 3C–E

Pileus 30–70 mm, convex to plane, pink to red, yellowish toward to center. Lamellae white when young, later pale cream-yellow, narrowly attached. Stipe 40–60 × 10–25 mm, clavate, white. Spores 6.5–8 × 5–6.5 µm, elliptical,

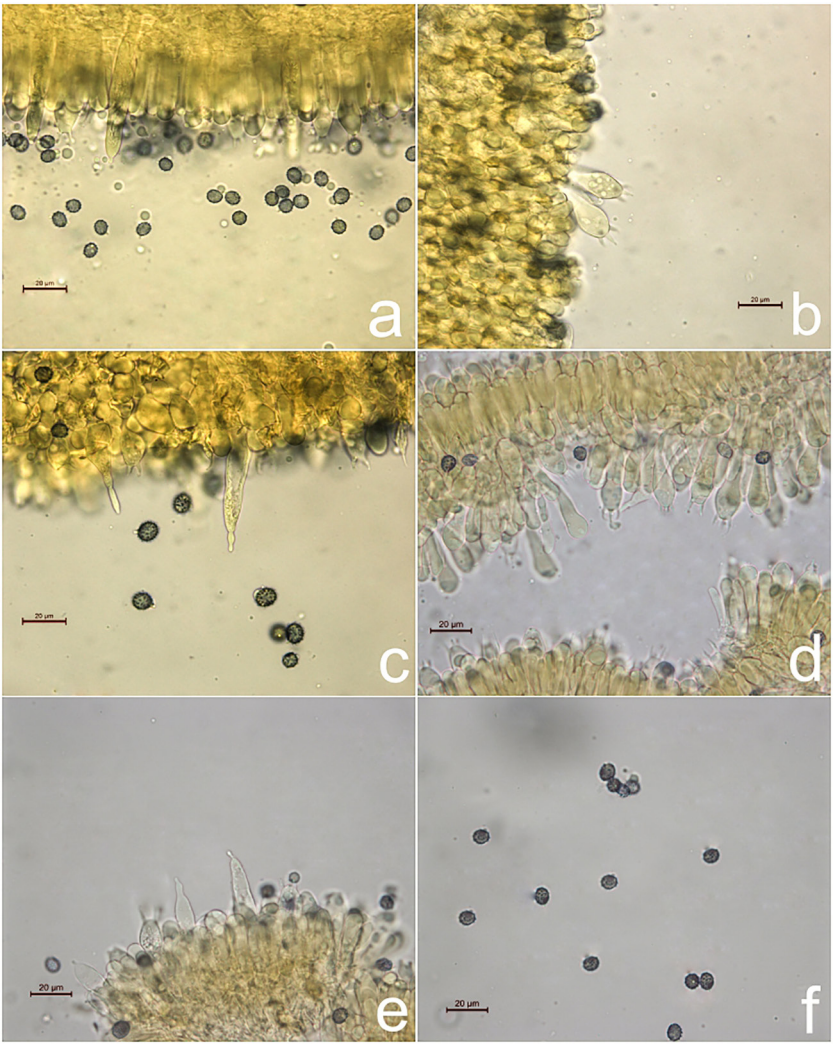

Figure 2. ***Russula clariana***: A, pleurocystidia and basidiospores. ***R. faginea***: B, basidia; C, pleurocystidia and basidiospores. ***R. odorata***: D, basidia;. E, cheilocystidia; F, basidiospores.

with elongated warts. Basidia 35–50 × 5–10 µm, clavate, with (2–)4 sterigmata. Cheilocystidia 40–70 × 5–15 µm, fusiform, most obtuse. Pleurocystidia 40–70 × 5–15 µm, fusiform most with an apical projection which is sometimes forked, with faintly gray-black contents in SBA.

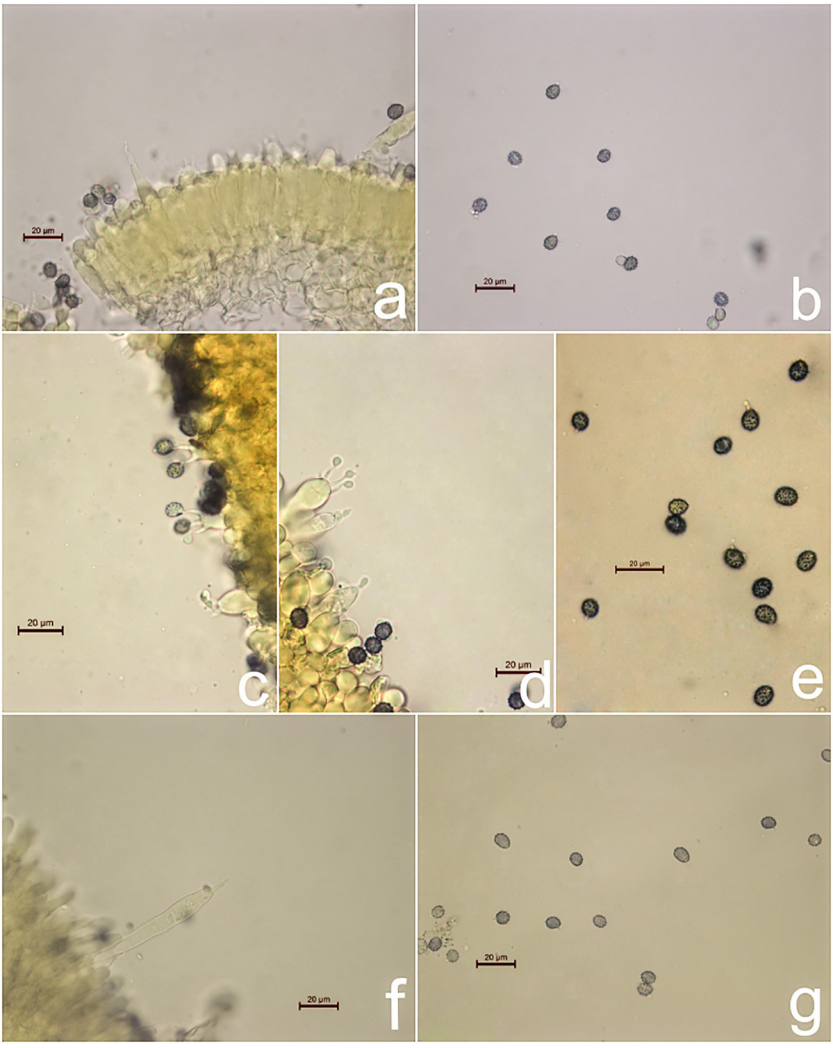

Figure 3. ***Russula insignis***: A, pleurocystidia; B, basidiospores. ***R. velutipes***: C, basidia (2-4 sterigmata); D, cheilocystidia; E, basidiospores. ***R. sericatula***: F, pleurocystidium; G, basidiospores.

Macrochemicals: $FeSO_4$ pink, phenol purple brown.

Specimen examined: **TURKEY**, **Bursa**: Mahmudiye, Taşlıyayla, 40°36′09″N 29°46′04″E, 947 m, on soil under *Fagus orientalis*, 4 Jun 2013, leg. H.H. Doğan & Ö. Öztürk HHD10314 (SELUK).

Discussion

Sesli & Denchev (2008) cite 108 *Russula* taxa as previously recorded for the Turkish mycobiota; six additional species are recorded here for the first time. The examined specimens do not significantly differ morphologically from the species descriptions in the literature. The simple key to the six identified species indicates the diagnostic differences among the species.

1. $FeSO_4$ reaction negative ..... *R. clariana*
   $FeSO_4$ reaction positive 2
2. $FeSO_4$ reaction light to dark green ..... *R. faginea*
   $FeSO_4$ reaction light pink to pink 3
3. Pileus rose, light pink, entire pileus whitening with age ..... *R. odorata*
   Entire pileus not whitening with age 4
4. Phenol reaction wine-red ..... *R. insignis*
   Phenol reaction not wine-red 5
5. Pileus purple-brown ..... *R. sericatula*
   Pileus pink to red ..... *R. velutipes*

Russula odorata has typically fruity odor and the pileus of our specimen was almost white, as it was old. *Russula insignis* is known as obligately mycorrhizal with *Quercus* species, and we did collect our specimen in an oak forest. A mycorrhizal association with *Fagus* and 2- to 4-spored basidia the important diagnostic characters for *R. velutipes*, which we observed in our specimen. *Russula faginea* can be easily distinguished with its dark green $FeSO_4$ reaction. In contrast, *R. clariana* is typical with its negative $FeSO_4$ reaction. *Russula sericatula* can be distinguished from the other species by its larger spores and a pileus that yellows toward the disc.

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